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March 11, 1961

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# SCIENCE NEWS LETTER

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## MEDICINE

## Slows Lymphatic Cancer

► ONE FORM of lymphatic cancer has been slowed down by a combination of three drugs given to laboratory animals, it was reported.

Chemical warfare against cancer through use of one of the drugs, beta-3-thienylalanine, or B3TA, was reported in 1956 by Dr. Robert W. Wissler, chairman of the department of pathology, University of Chicago.

With Dr. Zdenek Hruban, who was working under the National Cancer Institute, National Institutes of Health, Dr. Wissler has now advanced research with B3TA and two other drugs.

Desoxypyridoxine or DB6, an anti B-6 vitamin, and phenylpyruvate, a protective chemical for normal cells, are the other drugs combined with B3TA.

B3TA, which is an amino acid analogue and protein growth antagonist, was the basic component of their study. This drug has the ability to slow down tumor growth without damaging cells of such organs as bone marrow, testes and intestinal walls in rats.

## MEDICINE

## Deaths From Infection

► MORE THAN 100,000 deaths from infectious diseases or processes are reported each year in the United States. Only the three major chronic diseases—heart disease, cancer and cerebral hemorrhage—exceed infections as a cause of death.

Blood poisoning, or septicemia, increased threefold during the 11-year-period from 1949 through 1959, Dr. Carl C. Dauer, medical adviser to the chief, National Office of Vital Statistics, Public Health Service, reported.

"During the same period," Dr. Dauer said, "the number of deaths from staphylococcal septicemia increased sevenfold, and deaths from other specified types and from unspecified types, about threefold."

Dr. Dauer called on physicians to be specific in certifying the cause of death. He

Combining B3TA and DB6 produced an additive effect on tumor weight, with laboratory findings of tumors weighing only about a fourth of those untreated. With either drug individually, the weight reduction was only about 50%.

The third drug, phenylpyruvate, was added in small amounts when an undesirable side effect of the other two drugs weakened the experimental animals.

The scientists said the three-drug combination reduced the weight of an experimental tumor called Murphy-Sturm lymphosarcoma and that when the drugs were stopped, the growth resumed.

Although the combination "appears to be promising in the treatment of lymphomas," they said to obtain a tumor regression it apparently "will be necessary to inhibit the tumor transaminases (enzymes that change the state of amino acids) more specifically."

Dr. Hruban is now an American Cancer Society Clinical Fellow.

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from the mother, will have an abnormally high protein-bound iodine level, which would be taken as a sign that the thyroid is working overtime.

Dr. Shapiro reports in the *New England Journal of Medicine*, 264:378, 1961, that this was the case in 51 mothers and their 63 children.

Since the iophenoxic acid can distort the thyroid picture, Dr. Shapiro believes that it should be discontinued as an aid in gall bladder X-rays.

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## MEDICINE

## Wart Cures Explained By Spontaneous Immunity

► OLD WIVES' TALES of wart cures can be explained by spontaneous immunity.

Dr. E. Richard Harrell, University of Michigan Medical Center, told the annual clinical conference of the Chicago Medical Society in Chicago that the mysterious and illogical wart "cures" some persons have experienced may be due to relative immunity.

The dermatologist said the virus responsible for the skin growth does not appear to be infectious to all human beings but that the virus may be contagious and initially acquired from a human source.

The wart virus is distributed almost everywhere, Dr. Harrell said, but those who do not have the virus growing on their skin, or those who have previously had such infection undergo spontaneous disappearance, have acquired a state of relative immunity.

The viral cause of these skin growths is well established, Dr. Harrell explained. During the past two years the wart virus has been maintained in tissue culture and has been photographed by the electron microscope.

Although warts on the back of the hand can be easily eliminated, eradication of others may be difficult. For example, the plantar wart, so named because it is on the underside of the foot, grows inward because of its position on a weight-bearing surface.

Also difficult to remove may be the wart growing around a fingernail because it goes deeply into the tissue and may extend beneath the nail plate.

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## PHYSIOLOGY

## Faulty Thyroid Test

► IN A CHILD with a normal thyroid, laboratory tests can be in error, showing that the gland is overactive. This wrong answer occurs if the child's mother had her gall bladder X-rayed long before he was born.

Dr. Robert Shapiro, of Yale University School of Medicine and the Hospital of St. Raphael in New Haven, Conn., reports that an iodine compound, iophenoxic acid, a radio-opaque substance drunk by patients about to have their gall bladders X-rayed, is the source of the trouble.

This substance is concentrated in the gall bladder at the time of the X-ray, but it

later enters the blood stream and becomes part of certain protein molecules, called protein-bound iodine.

The amount, or level, of protein-bound iodine in the body is included in the test for overactive, or underactive, thyroid gland, since the thyroid normally is the only source of this substance.

The strange facts about the iophenoxic acid are that it can remain in the body as long as 33 years and can cross the placental barrier, the connection between mother and child during gestation. Thus, not only the mother, who actually drank the acid, but also the child, who received it indirectly

## MEDICINE

## Rare Postmortem Cesarian Successful

► THE SUCCESSFUL cesarian delivery of a four-pound, nine-ounce girl after the death of her 28-year-old mother is reported in the *Journal of the American Medical Association*, 175:715, 1961.

Dr. John W. Ritter of Seattle, Wash., states that in the past 250 years, only 120 successful postmortem cesarians are known to have been performed. He said the child is now four years old and shows no mental or physical defects.

The mother died of rheumatic heart disease.

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## ANTHROPOLOGY

# Oldest Murder Unearthed

An anthropologist has discovered the oldest murder, committed over 600,000 years ago in East Africa. The first Chellean man was found nearby.

► THE OLDEST MURDER in human history has been discovered and unearthed.

The victim was a child, about 11 years old, whose skull was fractured by a blow. An adult's remains found nearby and the partial skull of the child are those of the earliest human tool-making creatures known to science.

The crime was committed more than 600,000 years ago in Olduvai Gorge, Tanzania, East Africa.

The discoverer, Dr. L. S. B. Leakey of the Coryndon Museum, Nairobi, Kenya, has brought the skull to America to show to fellow anthropologists. Dr. Leakey announced the discovery to the British scientific world in December, 1960 (SNL, 79:23,

1961), but since this time Dr. Leakey has evaluated the find and discovered the murderer.

The newly-found most ancient human remains are still unnamed. Dr. Leakey also discovered in 1959 another ancient man, at Olduvai, *Zinjanthropus boisei*, who lived more than 600,000 years ago.

However, he said that the new find is even older than *Zinjanthropus*, although this more ancient man apparently was of different stock from *Zinjanthropus*, with a larger brain case and teeth more like human teeth. (*Zinjanthropus* has been called Nut-cracker man because of his huge teeth.)

Dr. Leakey said the new find of the more ancient man was made when his 19-

year-old son found the jaw of a saber-toothed tiger about 250 feet from where *Zinjanthropus* was found. A dig was made on the spot and the remains discovered.

These remains included bones of a hand and a foot, the first such bones of an early man. The earliest hand and foot bones known up to that time were those of Neanderthal man who lived about 50,000 years ago.

The hand and foot bones may give the clue to the overall size of the individual, but Dr. Leakey said he has not yet determined the size.

However, he said that the collarbone of the child was as large as that of a modern-day male adult. This does not mean that this ancient child was a giant, but that he or she had a very heavy bone structure.

Dr. Leakey also reported the finding of the first skull of Chellean man nearby, whom anthropologists have sought for more than a century. Chellean man's tools have been found in Europe, Asia and Africa, but he himself has not been found before. He is reported to have lived about 400,000 years ago.

Dr. Leakey was in Washington, D. C., to address meetings at the National Geographic Society and the Cosmos Club.

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## PUBLIC HEALTH

## Mail Order Quack Can Kill His Victims

► THE MEDICAL mail-order quack may be a killer.

By delaying early and proper treatment by a physician, victims of mail-order quackery are in danger of injury and death, Harry Kursh charged in an article in Today's Health, March, 1961, published by the American Medical Association.

Mr. Kursh said that peddling useless drugs, fake remedies and gadgets in the United States mails is a "lucrative source of income for some of the meanest sharpies in the world."

Despite the vigilance of U. S. Postal Inspection Service, which has prevented mail-order quackery from becoming a worse swindle than it is, the U. S. public was cheated out of \$50,000,000 last year by mail-order frauds, Mr. Kursh said.

So-called cures for patients with heart disease, arthritis, rheumatism and cancer are advertised on the theory that some people will pay anything for a promised "miracle."

The report charged that mail-order diets "without exception" are either "worthless or misleading." It said "the most vulnerable suckers on the mailing list are those who have ailments frequently associated with obesity—diabetes, thyroid disease, and heart, liver and kidney trouble."

Advising that "your best protection is your own doctor," Mr. Kursh said the physician can look into suspicious medical advertising more quickly and reliably than the patient.

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**DISCOVERER OF EARLY MAN**—Dr. L. S. B. Leakey holds a cast of his find of the first skull of Chellean man who lived about 400,000 years ago in East Africa. On the table are casts of his finds of skull parts of an adult and a child who lived there more than 600,000 years ago. The child's teeth (next to the skull parts) indicate he (or she) was 11 years old at the time of death when killed by a blow on the head.

## VETERINARY MEDICINE

# African Animal Diseases

► COUNTRIES badly in need of meat dare not import it from Africa because of the risk of disease.

Dr. Fred D. Maurer of the Armed Forces Institute of Pathology in Washington, D. C., said that control and eradication of African animal diseases is vital.

Dr. Maurer, who has done research in Africa on rinderpest and African swine fever, charged that the reluctance of all countries to import African animals is preventing the exchange of food badly needed.

"This is not only critical to the world's food supply," he said, "but it is an important key to improvement of the economies of both agriculture and industrial countries."

"The ever-increasing volume and speed of trade and travel has provided new opportunities for these diseases to spread," he said. "Countries that benefit from modern industrial transportation must face the problem it has created. They should help to eliminate the diseases while they are localized."

Blue tongue in sheep and cattle is transmitted by Culicoides flies, which have a world-wide distribution. This highly fatal, viral disease has been in South Africa since sheep were imported before 1800, and has since spread through much of southeast and northeast Africa to the Mediterranean.

## AGRICULTURE

## Pain From Riding Tractors

► FARMERS ARE ASKING FOR improved design of tractors and other farm machinery because of vibration that produces low-back pain.

Dr. Franklin H. Top, director of the University of Iowa's Institute of Agricultural Medicine, reports in the *Archives of Environmental Health*, 2:150, 1961, that farm machinery is now being improved but much still needs to be done, and the institute is working on the problem.

Dr. Top states farmers reported that on a tractor there is not sufficient provision for absorbing the vibration and jolts. To stay on a tractor, the farmer stands up, and apparently his legs absorb the vibration.

Farm accidents are sometimes caused by lack of simple equipment that manufacturers are glad to provide when informed, Dr. Top reports.

The injuries of four victims of cornpicker accidents showed that the same type of machine was involved.

"The manufacturer of the cornpicker was supplied with our findings and photographs of his tractor-mounted cornpicker with unshielded gears. Six months later plans had been made to equip all new cornpickers of this manufacturer with shields to protect the operator from the hazard uncovered in Iowa," Dr. Top says.

Arrangements also were made for every

In 1952 it was diagnosed in the United States, where it was found in 13 western states. It was found in Japan in 1960 and killed a reported 40,000 sheep.

In South Africa the commercial raising of sheep is dependent on the annual use of 25,000,000 doses of blue tongue vaccine.

Also transmitted by Culicoides flies or midges is African horse sickness (AHS), which goes back to 1719. It has continued to be the most destructive of diseases to the equine species in Africa. In 1959 the disease spread to Iran, Afghanistan, West Pakistan and in 1960 to India, Iraq, Syria, Turkey, Cyprus, Lebanon and Jordan, and losses in these countries were estimated at 170,000 head.

African swine fever, similar to hog cholera, for which there is no vaccine and which is usually 100% fatal, recently spread to Portugal and Spain, and has caused losses in Spain alone of more than 100,000 animals. It has cost the Spanish Government \$9,000,000 in control efforts.

Dr. Maurer has been on a U. S. Department of Agriculture committee to review the United States import regulations and facilities for animals. He said the U. S. guards against importation of animals that are diseased and subjects all animals to quarantine before they are admitted. The principal quarantine point is in Clifton, N. J.

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dealer throughout the United States and Canada to receive a supply of the shields, which also can be used on previous models at low cost.

Only three institutes of agricultural medicine exist in the world. Poland was first to establish one ten years ago. Iowa was second, in 1955, and a third was founded in 1958 in connection with the University of Tours in France.

Recently the University of Illinois established a Zoonoses Center which is concerned with animal parasites and diseases that can be transmitted to man from animals.

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## TECHNOLOGY

## New Data Processing System Developed

► A NEW ELECTRONIC data processing system has been developed that utilizes wasted manpower and unused high speeds normally resulting from even the most advanced computer systems.

Developed by Burroughs Corporation in Detroit, Mich., the system, called the B5000, is the first computer designed especially for automatic programming.

Programming time and problem-solving

costs long associated with conventional computer systems are drastically cut by the solid state system, it is claimed.

The unit is adapted for solving both business and scientific problems.

The B5000 is a very high-speed data processing system that automatically adjusts to its own environment, schedules and keeps track of its own work load, and tells itself as well as the human operator how it is doing, it was reported.

The B5000 helps reduce programming costs because it accepts both programs written in algebra (for scientific and engineering problems) and English language statements (for business data processing).

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## ENTOMOLOGY

# A-Bomb Test Tags Moth

► A MIGRATORY MOTH that got mixed up in the French A-bomb test in the Sahara Desert has helped British entomologists bolster a long held theory—that some of their moths winter in Africa rather than Europe.

When France announced its first successful A-bomb test on Feb. 13, 1960, Dr. H. B. D. Kettlewell of the University of Oxford saw a chance to test the theory. If he could find radioactive moths in England, it could mean that they had come from the Sahara.

Dr. Kettlewell posted requests for specimens of early migrant moths in British and other European journals. Of the several hundred specimens sent to him, only one was radioactive. The moth was taken in March at Steeple Barton, Oxford, and was identified as *Nomophila noctuella*, a species with a one-inch wing span which is also found in the United States.

Dr. M. J. Heard of the Atomic Energy Research Establishment at Harwell, England, studied the moth and found a single radioactive particle in its chest.

All available evidence indicates that the moth and the particle were actually in the Sahara on test day. The particle is believed to be composed of fused silica colored by traces of metal and is "entirely typical" of particles seen after atomic explosions at ground level. Decay in radioactivity was about the right amount expected for particles made radioactive on the day of the Sahara test.

The particle could have drifted over Europe and been picked up there by the

moth, but the main radioactive cloud from the Sahara test did not pass over western Europe until Feb. 26, too long for very many particles of this size to remain in circulation.

Drs. Kettlewell and Heard report in *Nature*, 189:676, 1961, that the moth probably picked up the particle in the Sahara on test day and somehow traveled the 1,500 miles to England in less than a month.

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## BIOCHEMISTRY

## Drugs Tested for Effect On Brains of Animals

► WHAT GOES WRONG in the brain of a schizophrenic, a person with the most common form of mental disease, may be learned through tests on animals. Lysogenic

## ANIMAL PSYCHOLOGY

# Chicks Like Bright Colors

► CHICKENS TEND to like bright colors and dislike dull or drab colors and black, a poultry scientist said.

However, chickens, like people, are individuals and also show individual preferences for different colors, Dr. George D. Quigley of the University of Maryland, College Park, Md., told SCIENCE SERVICE. For instance, yellow is generally "disliked"

acid (LSD), which is a potent brain poison, may interact with serotonin, a substance that occurs naturally in the blood and brain of animals as well as human beings.

Dr. Werner Koella of the Worcester Foundation for Experimental Biology, Shrewsbury, Mass., said that he had produced deviations in nervous activity of cats and rabbits with lysergic acid.

The animals show a large degree of variability in response, which is drastically reduced with LSD doses, Dr. Koella reported at a symposium on psychopharmacology in Boston.

"The next step is to learn more about the functional significance of serotonin in the brain," Dr. Koella said. "Possibly the effect of certain tranquilizers such as reserpine may through interaction with serotonin restore the brain to its normal balance."

Previous experiments have failed to determine whether schizophrenia is connected with a deficiency or excess of serotonin.

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by the chickens Dr. Quigley is testing for color recognition and preference. Nevertheless, some of the chickens apparently "think" it is prettier than all other colors by the preference they show for yellow.

Dr. Quigley said he has had the nests of the chickens he is testing painted pink, red, blue, orange, yellow, tan, brown, black and metallic gray. He also uses such combinations as a brown nest box on a yellow background.

Dr. Quigley said a hen habitually lays its eggs in a certain nest. When the poultry scientist finds out where a hen lays its eggs the two nest boxes on either side of the one the hen uses are painted in colors different from the dull neutral gray of the unpainted nest. If the hen changes its egg-laying to one of the painted nests, it has recognized the color and shown preference for it.

Dr. Quigley said color preference does not seem associated with food preference. Also, as far as it has been determined, the color of the nest does not influence the hen to lay more or fewer eggs. On the other hand, the color a hen prefers may be a clue to the health of the bird, Dr. Quigley said.

The color perception of chickens is different from that of humans; they do not see as well in blue light as humans do but see better in red light than humans do.

Dr. Quigley plans to find out if baby chicks will be influenced by a color if exposed to it for only one to three days after birth. Using this method, called imprinting, Dr. Quigley will later expose the chickens to the same color, among many other colors, to see if they remember it.

He said that so far he has only preliminary results of the color tests but expects to have further results of his studies this summer.

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CHICK PICKS A COLORED NEST

## GEOPHYSICS

# Radiation Belt Discovered

► ANOTHER RADIATION BELT surrounding the earth has been discovered by Russian scientists, in addition to the two radiation belts discovered by Dr. James A. Van Allen of the State University of Iowa.

Soviet rockets shot into space have detected a radiation band of charged particles about 34,000 miles away from the earth. Sensitive rocket instruments have recorded the belt as far out as 46,000 miles.

Russian scientists said the belt is formed when the weak "solar wind" meets the earth's magnetic field, trapping the low-energy particles of the solar wind. The trapped particles form a flux or band of weak energy electrons surrounding the earth. The solar wind is a permanent flow of charged particles given off by the sun.

The "new" radiation zone discovered by the Russians may actually be a remnant or "tail" of the outer Van Allen radiation

belt, the National Aeronautics and Space Administration said in Washington, D. C. The outer Van Allen belt extends out beyond 30,000 miles, which is near the new belt claimed by the Russians.

United States rockets have not detected this new energy band because instruments sensitive enough to record the low-energy particles have not yet been flown through it. U. S. instruments were responsible, however, for the discovery of the Van Allen radiation zones.

The Russian discovery is reported by I. S. Shklovskiy, V. I. Moroz and V. G. Kurt of the Shternberg State Astronomical Institute in Moscow, in a recent issue of the *Astronomicheskiy Zhurnal*, abstracted by the United States Joint Publications Research Service.

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## TECHNOLOGY

# Gases Tell Water Supply

► GAS BUBBLES trapped in water can tell scientists whether a city has a sufficient water supply to quench its residents' thirst.

United States cities tapping underground reservoirs for their water can determine how much water they have by measuring the amount of certain dissolved gases in the water.

Dr. Ryuichi Sugisaki of Nagoya University, Japan, found that the underground water supply varied with the percentage of trapped gases. Rain water seeping into the ground has a higher percentage of trapped gases in winter than in the summer. The underground reservoirs, which absorb this water, reflects this annual difference by their changing gas content.

As long as the amount of dissolved

gases fluctuates normally according to the season, water must be continually filtering through the ground into the reservoir tapped by water wells. If the gas content stays relatively constant, little or no water is penetrating through, and the water supply becomes dangerously low.

Water-well samples should be taken many times during the year for accurate testing, Dr. Sugisaki reported in the *American Journal of Science*, 259:144, 1961.

The percentage of dissolved gases in the water soaking into the ground mirrors the changes in atmospheric temperature. The higher the temperature, the less gas is dissolved by water.

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## TECHNOLOGY

# Improved Time Standard

► A NEW STANDARD of accuracy for broadcasting time signals and constant frequency has been achieved at the U. S. Naval Observatory, the nation's official timekeeper. Time is kept with an accuracy of one part in ten billion.

A watch set to match this accuracy would lose less than one-hundredth of a second in three years.

The basis of the atomic clock is an oscillation produced by the cesium atom. The frequency was determined by the National Physical Laboratory, Teddington, England, and the U. S. Naval Observatory jointly.

The high precision broadcasts of time and frequency made possible by the new standard will allow more accurate tracking of artificial satellites and help improve naval communications and radio navigation.

Communications networks across oceans and continents will also be improved by such broadcasts.

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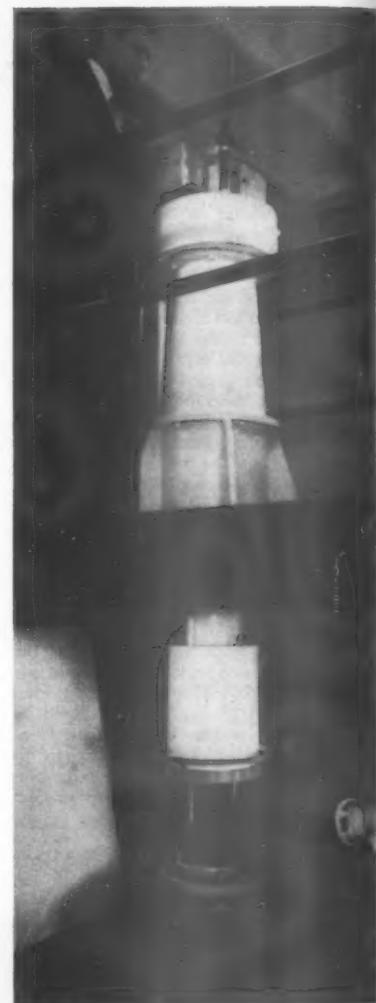
## GEOPHYSICS

# Earth Gradually Slows Then Speeds Up a Little

► FROM 1955 TO 1958 the earth slowed down, but since that time it has speeded up again.

However, the change of rotation speed was so slight that photographic zenith telescopes were needed to determine the time change, Dr. Wm. O. Markowitz of the U. S. Naval Observatory told the Philosophical Society of Washington.

He said the earth slowed down by one-thousandth of a second between 1955 and



**ZENITH TELESCOPE** — Used for determining standard time in the United States and the time change of the earth's rotation.

1958 and speeded up since then by three-tenths of a thousandth of a second.

Dr. Markowitz said he and Dr. R. Glenn Hall, also of the Naval Observatory, based their findings on comparison of atomic time with time based on the rotation of the earth. He said the changes in the earth's rotation speed occur gradually and not suddenly.

Observations of the moon for the past 300 years have shown that the rate of the earth's rotation varied. However, until the construction a very accurate atomic clock, by the National Physical Laboratory, Teddington, England, in 1955, it was not possible to determine if the changes in speed were sudden or gradual.

Cesium beam atomic oscillators were used to derive atomic time. The frequency of cesium used for the atomic clock is 9,192,631,770 cycles per second.

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## ROCKETS AND MISSILES

# U.S. Forces Race in Space

► IN THE RACE for space, the United States now appears to be competing with itself as well as with the USSR.

The internal competition is between the National Aeronautics and Space Administration and the U.S. Air Force, both of whom have scored major successes in space in recent weeks.

The civilian agency has to its credit the launch and recovery in its Project Mercury program of the chimpanzee in a sub-orbital flight down the Atlantic Missile Range, the achievement of the solid-fuel firing of the Scout satellite, the successful Atlas shot of the Mercury capsule designed for man in space. These are, at least, matched by the Air Force solid-fuel Minuteman shot, the Samos satellite, the orbiting of two more Discoverer satellites and the redirecting in space of Discoverer XXI.

The Air Force Discoverer program now is virtually operational.

The Discoverer successes were followed by rumors that the Air Force might attempt an orbit and recovery with an ape.

## ROCKETS AND MISSILES

# Ionosphere Probe Readied

► THE IONOSPHERE Beacon Satellite S-45, planned to take a better look at the peaks and valleys of the ionosphere, is scheduled for a second try after it failed to orbit when launched the first time.

The satellite, which looks very much like Explorer satellites VII and VIII, will travel to an orbit of 1,600 miles at apogee (point farthest from earth) and 240 miles at perigee (point closest to earth). The satellite is expected to complete an orbit every 116 minutes.

So far, little is known about the ionosphere, the ionized fringe area at the top of the earth's atmosphere from 50 to several hundred miles up.

Long-range communications and weather forecasting would be aided by data from the ionosphere.

The 74-pound satellite will transmit on six frequencies at varying levels of power. Ground stations will analyze the signals by various methods such as change in polarization or Doppler shift.

If the S-45 goes successfully into orbit, it will be numbered in the Explorer series by the National Aeronautics and Space Administration to indicate that it has joined the other U. S. satellites that so far have contributed to the world's knowledge of space.

Several universities in the United States and New Zealand are participating in this satellite experiment, trying to find out more about the structure of the ionosphere.

The launch vehicle for the S-45 is the Juno II, a 60-ton three-stage rocket used before in seven launch attempts, including the Pioneer III and IV radiation space probes, the Explorer VII radiation satellite

A success of this magnitude in space could make a monkey of the sub-orbital launch and recovery of a Mercury astronaut planned for early this spring.

The civilian and military achievements raise serious questions about the validity of the current division made both by the Administration and the Congress between the civilian mission of our efforts in space and military defense.

All satellite launches, whether for military or non-military objectives, call for the same technological prerequisites. NASA's Project Mercury must make use of the Air Force's Atlantic Missile Range launching and tracking facilities.

Even purely scientific data from a meteorological or communication satellite will provide essential information for space utilization in the interests of defense. And all of the Air Force probes have yielded important scientific data.

In view of the mounting costs of space exploration, it may be argued that the rule of "divide and conquer" is not applicable

and the Explorer VIII ionosphere satellite. The S-45 satellite will be launched from Cape Canaveral.

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in space and can only lead to needless delay in U.S. efforts to match and outstrip the spectacular firsts of the Soviet Union.

This conflict has extended even to interservice rivalry in the defense establishment with the Navy also making a bid for space.

Orderly, long-range and imaginative planning under unified command appear to be required if the waste of self-competition is to be avoided.

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## GENERAL SCIENCE

## Physicist Named to Atomic Energy Body

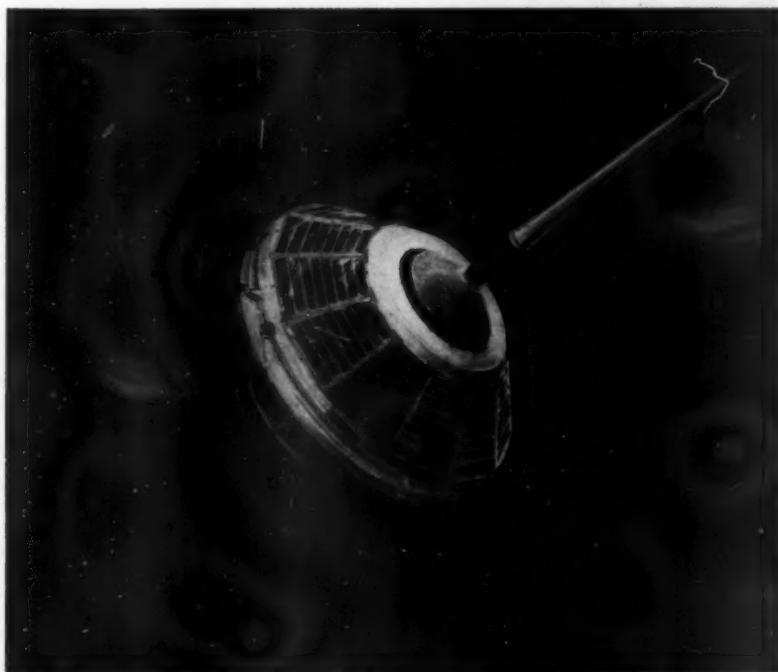
► THE FIFTH MEMBER of the Atomic Energy Commission has been named by President John F. Kennedy. He is Dr. Leeland J. Haworth, director of the Brookhaven National Laboratory, Long Island, N. Y.

The 56-year old nuclear physicist is an authority on the design of high-energy atom smashers and has been director of the AEC's Brookhaven Laboratory since 1948.

He was named president of the Associated Universities Inc., last December. This is a group of Eastern universities operating the Brookhaven Laboratory and the National Science Foundation's National Radio Observatory in Green Bank, W. Va.

Dr. Haworth's appointment places three scientists on the AEC. The other two scientists are chemists, Dr. Glenn T. Seaborg, Nobelist as chairman, and Dr. Robert E. Wilson. This is the largest scientific representation on the AEC in 15 years. The other AEC members are lawyers.

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EXPLORER-TO-BE—Beacon satellite S-45 will explore the ionosphere.

## MEDICINE

**Lump in Throat  
Rarely Means Tumor**

► THE SYMPTOMS of "a lump in the throat" often comes from emotional disturbance. *Globus hystericus* is the technical name for the sensation of choking, frequently seen in hysteria. Only rarely does the symptom indicate a tumor.

A total of 207 patients studied showed no sign of an organic disease, although Dr. H. B. Lockhart of Vancouver, B.C., Canada, who made the study, said the possibility of tumor should not be ruled out in diagnosing such cases.

The patients selected for study were followed for at least 12 months, and nearly 90% appeared to respond to reassurance and "superficial psychotherapy," the physician said.

Dr. Lockhart described a typical case of *globus hystericus* as that of a female patient. (The ratio in his study was two women to one man complaining of a lump in the throat.)

"The patient is usually not able to localize the lump too accurately," Dr. Lockhart reported in the Canadian Medical Association Journal, 84:316, 1961. "She is about 40 years of age, tense and unduly concerned about 'a lump' she has had in her throat for several months (average 6.3 months)."

The "lump" is worse when "she is tired and most noticeable while she is swallowing saliva."

A thorough examination fails to reveal any significant abnormality and very frequently the patients admit that they have been associated in some way with a person who has or had a malignant tumor.

Many admitted that improvement began as soon as they realized there was nothing seriously wrong. One woman claimed that her symptoms disappeared when she stopped eating onions, and other "unusual explanations" by male patients included the use of gasoline in a cigarette lighter and drinking some bad water.

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## SOCIOLOGY

**Life Found in Space May  
Affect Religious Ideas**

► IF LIFE is ever discovered in space by radio messages or direct exploration, religious leaders will be in for a shock, a social scientist, Dr. Donald N. Michael of the Brookings Institution, Washington, D.C., predicted at the Seagram Symposium devoted to "Life in Other Worlds" in New York.

If another world proves to be inhabited, Dr. Michael suggested that its inhabitants may be completely indifferent to communications with people on earth because of their differences in motives, behavior and perceptions.

Religious ideas on life may be affected by discovery of other life in space, Dr. Michael predicted.

Astronomers are pessimistic about life on other of the sun's planets more advanced

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than possibly lowly mosses on Mars. Dr. Harlow Shapley, Harvard University astronomer, told the symposium that except for the earth, the solar system is essentially sterile biologically. There are no men on Mars. If communications were established with Mars, Dr. Shapley said, "it should be one lowly moss talking to another."

Many of the billions of planets in the observable universe may well support living organisms, Dr. Otto Struve, director of the National Radio Astronomy Observatory, Green Bank, W. Va., told the meeting. But it is quite uncertain, he said, whether any intelligent beings are trying to contact us by radio signals, although Dr. Struve has directed a project that has listened for such signals.

The new world that it is now most urgent for us to make contact with are "the spiritual worlds within ourselves," Dr. Arnold J. Toynbee, the British historian, declared.

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## TECHNOLOGY

**Studying Odors Helps  
Designers of Vehicles**

► INVESTIGATORS of the human nose have produced a novel aid to designers of ships, aircraft and other vehicles: an electrical way of making fields of flow visible.

Walter Pitts and Bradford Howland of the research laboratory of electronics at Massachusetts Institute of Technology, Cambridge, Mass., developed the apparatus during studies of olfactory stimulation. Their apparatus enables engineers to see, photograph and measure turbulence caused by a wing, a cylinder or whatever else engineers wish to study.

The builders had set out to devise a model of what happens in the human nose when chemical information is turned into electrical information for transmission to the brain. During this effort, they looked into electrochemical effects of fluid motion past an electrode.

Luminescent chemicals have long been known. By placing such chemicals in a solution and moving an anode through it, or permitting the solution to flow past an anode, it was found that some of these chemicals can be triggered into glowing. The anode can be given any desired shape.

Mr. Howland has obtained such impressive pictures of fluid motion that artists as well as engineers are interested in his technique.

Other methods of making fluid motion visible have been developed, but this one is advantageous in some research because the luminescence begins right at the surface of the electrode, its extension into the wake can be controlled by varying the contents of the fluid and the voltage in the circuit.

Development of the method was supported in part by Bell Telephone Laboratories, Inc., the National Institutes of Health and the Teagle Foundation, Inc., according to *The Technology Review*, published by MIT.

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## IN SCIENCE

## MEDICINE

**Lack of Enzyme Produces  
New Muscle Disease**

► WHEN NATURE FAILS to provide human muscles with a particular enzyme, weakness and cramps result.

This condition has been recognized as a new muscle disease by Dr. Carl M. Pearson of the University of California, Los Angeles, Medical School. The disease is the result of the absence of phosphorylase, which is important in the chemical process of producing muscle energy.

The disease was discovered in a 19-year-old male who had a lifelong history of progressive weakness upon using exercised muscles, and severe cramps if exertion was intense or prolonged. During normal walking he experienced no difficulty. The patient was not aware of having any disease, and merely attributed his reactions to "being out of condition."

Apparently nature did not include the phosphorylase enzyme in the skeletal muscle of the patient because of some faulty genetic mechanism. The enzyme, which varies somewhat in different types of tissue, is presumably present in the patient's liver, and possibly heart and types of tissue other than skeletal muscles.

At present there is no specific treatment for the disorder. The patient is able to carry out normal activity, and his physician is hopeful of preventing permanent damage from long-term effects of the metabolic defect.

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## BOTANY

**Prairie Fire Heats  
Little Below Ground**

► THE HEAT of a prairie fire may reach a temperature well into the 1,000-degree Fahrenheit range a few feet above the ground, but there may be no heating at all an inch or two below the surface of the ground.

Tests by Richard Vogl and Prof. John T. Curtis, University of Wisconsin botanists, showed that during burning, temperatures may often rise to 325 degrees at four inches above the ground, but they seldom reach more than 150 degrees a half inch below the surface, 60 degrees at an inch below, and show no appreciable increase at two inches below. The men used special pyrometers in their tests.

A backfire, creeping slowly against the wind, heats the ground the most, while a headfire sweeping with the wind heats it but little, the two researchers found. In the case of a headfire, peak intensity of the temperature is found at heights of 18 inches or more above ground.

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## SCIENCE FIELDS

## PHYSIOLOGY

**Research With Squirrels Backs Theory of Seeing**

► RESEARCH WITH the antelope ground squirrel has helped support the theory that it is impossible to gaze steadily at anything and that humans see only when visual cells are in motion.

Dr. Frederick Crescitelli, zoologist at the University of California, Los Angeles, has been studying this apparent visual cell motion in reference to the image on that part of the eye known as the retina.

The antelope ground squirrel has only the type of visual cells (cones) used in daylight vision. It does not possess rods, the visual cells that adapt to dim light and enable humans to see at night. Consequently, the squirrel stays in its hole at night.

By means of a special apparatus, Dr. Crescitelli was able to trace the electrical signals initiated when light strikes the visual cells and is transmitted as impulses to the portion of the brain (cortex) concerned with vision.

There are two types of signals: 1, an "on" impulse generated when the light beam is on a particular cell, and 2, an "off" impulse which occurs when the cell shifts away from the light.

"On" and "off" signals for white and colored light were detected in both the retina and cortex of the squirrel. The pattern of signals suggested an important role in vision for the involuntary motion of the visual cells.

Thus the theory of the importance of visual cell motion in the seeing process was supported.

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## MEDICINE

**Horse Lung Study May Aid Human Disease Probe**

► THE STUDY of emphysema, an incurable respiratory disease, may be helped by the fact that the horse lung closely resembles that of man.

In the past, experiments may have been unsuccessful in producing emphysema in commonly used animals because the animals do not possess lungs anatomically similar to those of man. Also they do not get the disease in a form similar to that found in human beings. Horses do develop emphysema.

Three scientists have studied the lungs of the cow, pig, lamb, dog, cat and monkey, as well as those of the horse, and found the horse to be the only animal with lungs anatomically similar to those of man.

Emphysema is characterized by enlarged air sacs in the lung, a condition that causes breathing difficulty. A significant finding was that only in the lung of man and the horse does the bronchial artery provide

blood directly to the air sacs. This lends strong but indirect support to the theory that emphysema can result from disease of the bronchial artery, the investigators said.

Using this theory as a basis for experimentation, the scientists produced a condition in a normal horse that was identical both to naturally occurring equine and human emphysema. But they cautioned that a great deal more investigation is required to confirm their theory.

The scientists who made the study are Dr. Richard F. McLaughlin Jr., University of California Medical Center, San Francisco; Dr. Walter S. Tyler, School of Veterinary Medicine, University of California, Davis, Calif., and Capt. Robert O. Canada, U. S. Naval Hospital, Bethesda, Md. Their findings were reported in the *Journal of the American Medical Association*, 175:694, 1961.

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## GENERAL SCIENCE

**Praises Unorthodox Scientific Ideas**

► "UNORTHODOX" scientific ideas or theories have frequently produced significant advances in the scientific world, Dr. Lawrence A. Wood, president of the Washington Academy of Sciences, said in Washington, D. C.

However, many of these theories were not readily accepted by the scientific world. Many scientists with unorthodox theories were forced to overcome strong opposition from scientists who vainly clung to conflicting opinions accepted at that time.

All the now generally accepted scientific theories had to face certain tests before they were accepted by the scientific community, Dr. Wood said.

In a historical survey of "unorthodox" ideas advanced by certain outstanding scientists, Dr. Wood noticed that four characteristics associated with successful theories usually appeared. Such scientists as Copernicus, Galileo and Louis Pasteur were "unorthodox," yet their scientific theories passed the tests.

The tests are, Dr. Woods said, that all experimental results be reproducible, reported, and supported by a theory. The theory must also be consistent with all the known facts. If an "unorthodox" idea can pass these tests, significant scientific progress will probably be made.

The human motives and personal factors involved in scientific work must not be underestimated. Scientists are human and cannot be expected readily to abandon a theory they hold, Dr. Wood said.

Galileo faced a heavy barrage of criticism when he contradicted Aristotle's dominance over scientific thinking during that time by denying that a heavy body necessarily falls faster than a light one. His dogged determination resulted in his famous ball dropping experiment from the Tower of Pisa.

This also established the modern scientific principle of verification by experiment.

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## NUTRITION

**Diseases Conquered By Enriched Bread**

► AFTER 20 YEARS of bread enrichment, a wartime measure that is continuing, the deficiency diseases, pellagra and beriberi, have disappeared as public health problems, Dr. W. H. Sebrell Jr., director of Columbia University's Institute of Nutrition Sciences, reported in New York. He spoke at a dinner, sponsored by the American Bakers Association and the American Institute of Baking, honoring the use of enriched flour for two decades.

The deficiency diseases due to the inadequate intake of the three B vitamins, thiamine, niacin and riboflavin, were on the increase in the early thirties. Pellagra, due to niacin lack, numbered in the hundred thousands with deaths of about 7,000 in the peak year. There were thousands of cases of deficiency of riboflavin, necessary for normal eye and skin, and an increasing amount of beriberi heart disease due to lack of thiamine. These are rarities now that people get the B vitamins and iron in bread.

There is discussion today as to the desirability of adding the amino acid, lysine, to enriched bread to improve its protein value, Dr. Sebrell observed. Phosphorus, which may have value in inhibiting dental caries, might also be added to bread. Research of the future may show that vitamin B-6, and even vitamin B-12, should be added to the diet through bread.

When margarine fortified with vitamin A, vitamin D milk and some source of vitamin C are used along with the enriched bread carrying the B vitamins, a sound ration could be provided at minimum costs.

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## AERONAUTICS

**Pilot Error Blamed For Most Air Accidents**

► PILOT ERROR causes or contributes to about 75% of general aviation accidents, James T. Pyle, acting administrator of the Federal Aviation Agency, said at a meeting of the Missouri Pilots Association in St. Louis.

"Pilots err most frequently in their judgment regarding weather and their inability to cope with it if caught in low visibility conditions," he said.

"Maximum safety and effectiveness of modern aircraft of all kinds requires that the pilot of the 1960's possess skills far in excess of the minimums prescribed by regulations," Mr. Pyle said. But "more regulation" is not the answer, he declared.

"What we need is more education," the Federal aviation administrator said. He said this could best be achieved by the pilots themselves through forums, seminars, and flying sessions through which they could exchange ideas and experiences aimed at improving flying.

Such meetings do not require an act of Congress or leadership by a Federal agency, Mr. Pyle emphasized, although "FAA is here to help."

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## PSYCHOLOGY

# Adult Behavior Predictable

**Fantasy from stories of a picture-story test shows that personality and behavior of the mature person can be foreseen in adolescence, Tove Neville reports.**

► AN ADULT PERSON'S love life can be predicted to a certain degree from his day-dreams in youth.

Psychologists have found that the fantasy content of stories dreamed up in a picture-story test, given to high school students and to 70% of the original group 13 years later, shows that a person's adult personality and the way he or she is going to act in the future can be foreseen in youth.

In the first test, stories from 42 cards, each depicting a situation, were used to determine the relationship between character and fantasy. In addition, an interview with the youth, an interview with parent, interviews with all the youth's teachers, an autobiography and information from school records gave additional information about each subject.

That future behavior can be predicted was illustrated by three young women of high school age who, when asked to think up stories about the pictures, wove fantasies about marriage. All three married early, and their marriages turned out to be happy and stable.

### Less Happy Parallel

Another subject of the psychological test lived out a less happy parallel of her day-dreams. In response to the pictures, Dorothy told stories about a girl with strong feelings about living with and caring for her father. In real life she married an older man who unconsciously reminded her of her father.

She claimed in a follow-up interview that her husband is impotent. The conclusion is that a feeling of incest is causing difficulty in the sexual relationship between the older husband and young wife.

In giving the tests originally, the late Dr. Percival M. Symonds, who was professor emeritus of education at Teachers College, Columbia University, found that normal, happy youths told realistic stories, free from exaggeration or distortion. Less well-adjusted youths told stories that did not correspond to their characters.

Young persons who told hostile stories were sissies, those whose stories showed depression were in reality cheerful and one who told stories bordering on the vulgar was sweet and demure. In many cases, the qualities the adolescents gave the characters in their stories were those repressed in themselves.

At the time the first study was made, reported in the book *Adolescent Fantasy* by Columbia University Press, psychologists wondered if predictions of the future of these young people could be made.

In the follow-up studies, 28 of the original 40 subjects participated in two sessions of story-telling and personal interviews. Only

20 of the 42 cards were used for the second test. However, a Rorschach test was given each subject.

When the researchers counted up the number of themes in the stories of the follow-up tests and compared them with the earlier ones, they found that only three themes: depression, guilt and wishful thinking had increased. A much larger number, including crime against property, criminal death, accidental death, escape, hostility, illness and accident, and mystery had decreased.

The number of times any one theme occurred generally stayed the same over the 13-year period, however.

Dr. Symonds particularly noted the themes that decreased were those most typical of early adolescence. He pointed out in a new book, *From Adolescent to Adult*, also by Columbia University Press, that there is a noticeable decrease in stories with happy endings. This, together with the increase in depression themes, indicates that the adolescent defense against guilt—magically turning catastrophe into a happy ending—has disappeared.

The themes of depression in the later stories showed undisguised disappointment, discouragement and dejection. Apparently adolescence is a period for hopeful fantasies. The adolescent sees himself in the future as rich, prosperous, achieving fame and

success. Thirteen years later disillusion has set in.

Comparisons made between early fantasy and later real life behavior in five areas—dependency, eroticism, aggression, self-striving and anxiety—showed that in many instances adolescent fantasy had worked itself out in a person's behavior or personality in later years.

Fantasies in adolescence directed toward a person of one's family were often seen to be shifted in later life toward wife, husband or children. Later attitudes toward sex were seen in adolescent fantasy.

Fantasies of confidence in adolescence belonged to persons who turned out to be confident and self-assured as adults. However, youths with fantasies of inferiority became ineffective adults who tried to compensate for real or imagined deficiencies.

### Pattern of Defense Adopted

There was also a definite parallel between anxiety in adolescent fantasy and anxiety in personality in later life. The defense against anxiety found in adolescent fantasy becomes the pattern of defense adopted in later years.

Psychosomatic or psychotic tendencies that appear in adult life may be foreseen in adolescent fantasy. Dr. Symonds sees fantasy as a function of change in the surroundings. If the situation does not change, neither do the fantasies.

Dr. Symonds found enough similarity in themes of fantasy over the 13-year period to match stories told by the same person, even when stories are mixed together with those of others.

The similarity of fantasy during the 13 years was seen most clearly when the stories told by the same individual were compared. One picture showing two women, one with her back turned, the other facing the observer with a frightened expression, caused a male subject both times to tell stories in which the theme was the death of the frightened-looking woman's father.

### Told Same Story Twice

In the first story the person tested said that the father had died in an automobile accident. In the later story he said the women had had "horrible news" about her father's death. He saw the other woman as the frightened woman's mother in both cases.

Dr. Symonds noted that the later story is less detailed, as if the subject is not able to spell things out with the same concreteness he did in the first story.

Another picture, showing a man slumped down on a chair, evoked stories that illustrated how some who took the test changed their stories from those full of wild excitement, violence and accidents, but ending happily, to gloomy and depressed stories. One subject as an adolescent saw in this picture a train engineer who goes through



**HAS FATHER DIED?**—Many persons related nearly the same stories in a picture-story test given 13 years apart, without remembering the pictures the second time or what story they had told the first time. One subject told both times that the "frightened" girl's father had died.



**IS MAN DEPRESSED?**—Some stories of the picture-story test changed from exciting and violent ones with a happy ending to depressed stories with possible happy endings. This illustrates confidence in youth that is dampened by disillusionment in later life.

two accidents plotted by crooks but still in the end keeps his job. In his later story about this picture, he sees a man who is moping over a setback, and although he predicts the man in the end will be happy, he sees him in the picture as depressed.

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#### PHYSICS

### Atomic Clock Shown To Top Young Scientists

#### See Front Cover

► A COMPACT "atomic clock" capable of measuring frequency and time intervals with high precision was demonstrated for top winners of the 20th Science Talent Search when the teenagers visited the National Bureau of Standards in Washington, D. C., on an especially arranged tour.

The portable measurement device will be valuable in determining precise orbits of satellites, in radio propagation studies and in navigational and communication systems.

The atomic clock monitors a microwave frequency of approximately 6835 megacycles, using rubidium vapor and light. The amount of light transmitted through the vapor measures the exactness of the microwave frequency being applied, with a variation of as little as one part in 100 million greatly reducing the light absorption.

The oscillator of the clock is automatically controlled to maintain such hyperfine frequency, precise to one part in 10 billion, over a period of months. It is even more precise for shorter periods.

During their visit to the Bureau, the Science Talent Search winners also saw demonstrations of the properties of materials at high temperatures.

A mass spectrometer for analyzing the gas components is shown on the cover of this week's SCIENCE NEWS LETTER by Dr. A. V. Astin, director of the Bureau (third from right) to the winners (left to right) Frederick Albert Matsen III, 17, Austin, Texas, Robert Lee Raymond, 17, South Bend, Ind., Dale Thorpe Smith Jr., 18, Tipp City, Ohio, Harriet Jane Fell, 16, Jamaica, N. Y., James Ivan Lepowsky, 16, New York, N. Y., Roger Paul Peters Jr., 17, South Bend, Ind.

The annual Science Talent Search for the Westinghouse Science Scholarships and Awards is conducted by Science Clubs of America, an activity of SCIENCE SERVICE, and is supported by the Westinghouse Educational Foundation.

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#### TECHNOLOGY

### New Electronic Principle In Unusual Radio Set

► ONE OF THE WORLD'S most unusual radio receivers has been developed to illustrate the principle of molecular electronics.

Built by Westinghouse Electric Corporation, the radio receiver is the first step toward an electronic system in which the whole system function is performed within a single block of material.

The U.S. Air Force reported this unit to be "the most complex electronic system yet achieved through such principles. It contains no tubes, no transistors, and no traditional electronic circuits. Its main working parts are simply six small silicon wafers about the size of a dime, but only one-fourth as thick."

The "working" area of each wafer is about the size of the head of a carpet tack. Yet, the receiver tunes in stations all across the standard broadcast band. Ordinarily such a set requires some 50 individual electronic components, including capacitors, coils and resistors.

The new receiver was demonstrated for the first time on March 3 to the 40 winners of the 20th Science Talent Search at the Science Talent Institute in Washington. The experimental model is designed to test the possibility of making complicated military electronic systems through the use of molecular electronics.

The next step will be the development and construction of an Air Force communications receiver, operating at high frequencies and based on the technology of molecular electronics.

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#### PHYSICS

### Progress on H-Bomb Power for Peaceful Uses

► ATOMIC energy scientists are hopeful they will soon be able to harness the H-bomb's thermonuclear reaction for peaceful uses.

The Atomic Energy Commission reported to the joint Senate-House Atomic Committee that scientists are scheduled to test a device, a magnetic machine that fuses hydrogen, before the end of March.

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# Books of the Week

For the editorial information of our readers, books received for review are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D.C.

**ALCHEMY TO ATOMS**—Ellsworth Newcomb and Hugh Kenny—*Putnam*, 128 p., illus. by Eva Cellini, \$2.95. The story of chemistry for young readers.

**THE ANATOMY OF THE RHESUS MONKEY**—T. H. Bast and others—*Hafner Pub. Co.*, 383 p., illus. by Benjamin Kopal, \$11.50. Reprint of 1933 edition with corrections.

**ANIMAL SIGNS AND SIGNALS**—Ted S. Petit—*Doubleday*, 60 p., illus. by G. Don Ray, \$2.95. For children.

**THE BEGINNING GARDENER**—Katherine N. Cutler—*Barrows*, 173 p., illus., \$2.95. Full of basic information.

**BIRDS OF THE WEST INDIES**—James Bond—*Houghton*, 256 p., illus. in color by Don R. Eckelberry and drawings by Earl L. Poole, \$6. Complete guide to the birds known to occur regularly in the Caribbean islands, from the Bahamas to Barbados.

**CULTURE METHODS FOR INVERTEBRATE ANIMALS**: A Compendium—Paul S. Galstoff and others, introd. by James G. Needham—*Dover*, 590 p., illus., paper, \$2.75. Prepared cooperatively by American zoologists under AAAS direction, as an aid to studies that require living animals in continuous supply.

**CYLINDRICAL SANDWICH CONSTRUCTION DESIGN**—Sidney Allinikov—*Wright Air Dev. Div. (OTs)*, 276 p., paper, \$4. Comprehensive treatment of the theories and parameters associated with design of cylindrical sandwich construction.

**THE DANCING BEES: An Account of the Life**

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and Senses of the Honey Bee—Karl von Frisch, transl. by Dora Ilse—*Harcourt*, 182 p., illus., paper, \$1.95. Reprint of classic, based on 45 years of field observations.

**DESIGN FUNDAMENTALS OF ANALOG COMPUTER COMPONENTS**—R. M. Howe—*Van Nostrand*, 268 p., illus., \$7.50. Describes in detail the design considerations that must be taken into account in the production of analog computer components.

**THE DYNAMICAL THEORY OF SOUND**—Horace Lamb—*Dover*, 2nd ed., 307 p., paper, \$1.50. Unabridged reprint of 1925 edition.

**ECONOMICS OF WATERSHED PLANNING**—G. S. Tolley and F. E. Riggs, Eds.—*Iowa State Univ. Press*, 339 p., \$3.95. Proceedings of 1959 Symposium which examined the problems of small watershed development.

**ELEMENTARY ALGEBRA FOR COLLEGE STUDENTS**—Irving Drooyan and William Wooton—*Wiley*, 272 p., \$4.95. Basic textbook.

**AN ENGINEERING APPROACH TO GYROSCOPIC INSTRUMENTS**—Elliott J. Siff and Claude L. Emmerich, foreword by C. S. Draper—*Speller*, 120 p., illus., \$7.50. Comprehensive review of principles and general features of existing instruments.

**ENGINEERS AND WHAT THEY DO**—Harold Coy—*Watts*, F., 186 p., \$3.95. Describes for young people the training, opportunities and specialties in the engineering profession.

**EVALUATION OF DRUG THERAPY**—Francis M. Forster, Ed.—*Univ. of Wis. Press*, 167 p., \$4. Proceedings of the Symposium on Evaluation of Drug Therapy in Neurologic and Sensory Diseases held at the University of Wisconsin, May, 1960.

**FEDERAL FUNDS FOR SCIENCE, IX**: The Federal Research and Development Budget, Fiscal Years 1959, 1960 and 1961—National Science Foundation—*GPO*, 89 p., paper, 50¢. Trends and statistics, showing how the U. S. Government will spend an estimated \$9.1 billion in 1961 for scientific research.

**FIELD EMISSION AND FIELD IONIZATION**—Robert Gomer—*Harvard Univ. Press*, 195 p., illus., \$6.75. Presented at an elementary mathematical level, this monograph may serve as an introduction to field and ion microscopy.

**FINITE DIFFERENCE EQUATIONS**—H. Levy and F. Lessman—*Macmillan*, 278 p., \$5.50. Puts emphasis on methods of solution, rather than on the study of basic mathematical issues.

**THE FOREST AND THE SEA: A Look at the Economy of Nature and the Ecology of Man**—Marston Bates—*New Am. Lib.*, 216 p., paper, 50¢.

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**HYDROGRAPHIC MANUAL**—Karl B. Jeffers—*Coast & Geodetic Survey (GPO)*, Pub. 20-2, 283 p., paper, \$2. Serves as guide in the execution and processing of hydrographic surveys.

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**THE WORLD OF LEARNING, 1960-61**—Europa Publications Ltd., 11th ed., 1,282 p., \$23.50. Up-to-date directory of the world's universities,

colleges, learned societies, libraries, museums and research institutes, listed by country, includes names of administrators and faculty members.

**X-RAY MICROSCOPY**—V. E. Cosslett and W. C. Nixon—*Cambridge Univ. Press*, 406 p., illus., \$15. Deals with the principles of the main methods of X-ray microscopy, with their use for qualitative microradiography and quantitative microanalysis, with examples of applications in biology, medicine, metallurgy and technology.

\* Science News Letter, 79:156 March 11, 1961

## Questions

**AGRICULTURE**—Where are the only three institutes of agricultural medicine located? p. 148.

**ANTHROPOLOGY**—How long ago did Chellean man live? p. 147.

**MEDICINE**—By what percentage did meningitis rise between 1957 and 1958? p. 146.

**Photographs**: Cover, pp. 147 and 149, Fremont Davis; p. 150, U. S. Navy; p. 151, National Aeronautics and Space Administration; pp. 154 and 155, Columbia University Press; p. 160, Vitro Products Co.

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## INVENTION

# Patents of the Week

An automatic air-traffic control system, a frost preventer for fruit growers and an automobile windshield visor for outdoor movie watching in the rain have been patented.

► AN AUTOMATIC device for air-traffic control system blanketing areas several thousand square miles in size is envisioned in an invention just patented.

The device would be entirely automatic, omitting all errors resulting from human operations in the present tracking systems, inventor Dan C. Ross of Wappingers Falls, N.Y., claimed.

Under this system, the position of airplanes operating in a certain area is determined by pulsed radio signals sent out from the plane. Ground stations sprinkled over a large area pick up the signals when a plane enters their region. The signals are timed by an "electronic clock" at each ground station and transmitted to a central computer station where the airplane's position is determined.

Readings from four different stations are needed to fix the exact position. The patent rights of this invention, patent No. 2,972,742, were assigned to International Business Machines Corporation.

Patent No. 2,972,208 was granted to Howard H. Martin of Waterford, Calif., for a frost preventer that is essentially a smudgeless smudgepot on wheels. To keep the usual smoke and soot from collecting on the fruit and the trees, Mr. Martin has devised a burner arrangement that he states will burn the fuel more efficiently and produce less

dirt in the process. The heated air is then blown toward the trees by a fan. The whole assembly is mounted on a platform that requires no tractor for pulling but can be driven to the spot where it is needed.

Drive-in movie fans can now go to the movies even when it is raining, Edwin N. Jacobs of Louisville, Ky., claims. Mr. Jacobs has invented a rain visor that can conveniently be mounted over an automobile windshield when the skies open up.

The flexible waterproof or plastic visor is attached by rubber suction cups. It is inexpensive, easily mounted and may be stored in a small place such as underneath the automobile seat, the inventor reported.

Windshield wipers help to some degree but they create a serious drain on the battery and motor. For his invention, Mr. Jacobs was awarded patent No. 2,972,377.

A new underground method for detecting oil-bearing sands and shales has won patent No. 2,972,251 for Elton Floyd Neil Harper of Tulsa, Okla. The method, assigned to Well Surveys, Incorporated, is based on resonance principles, the same phenomenon that makes a piano string vibrate in tune with a tuning fork. In the case of oil, however, the resonance involved is not sound but heat resonance, in the infrared region.

• Science News Letter, 79:158 March 11, 1961

## MATHEMATICS

# Computer Designs Plant

► A SYSTEM OF LOGIC by which an electronic computer can be used to design the most efficient plant to produce any type of chemical has been devised by a Shell research team of engineers and mathematicians.

In a final test of the system, the computer designed a chemical plant that would cost from \$250,000 to \$600,000 less to build than the best previous design. This saving represents from five percent to six percent of total construction costs.

The plant is designed to produce ethylene oxide—used in making antifreeze. The computer's design also reduced the cost of producing the chemical by five percent to ten percent.

The initial parts of the new computer program were tested on a process to make polyisoprene, the synthetic twin of natural rubber, and on the design of plants used to produce gasoline. Similar savings were obtained for these processes.

The system of logic, called CHEOPS for chemical engineering optimization system, is set up to handle mathematical models for

each of the units used to manufacture chemicals. The units are tied together by equations governing the flow of all chemical streams that could possibly wind through the plant complex.

To design a plant, an engineer feeds the computer three types of information.

1. He tells the computer which of the units are needed to produce the given chemical and the route by which streams should flow between the units.

2. He gives the machine the best available information on the process to make the chemical, including advice to ignore impractical situations such as reaction temperatures that would melt steel.

3. The factors the computer can vary in working its way to the most economical design, that is, temperature, pressure and other environmental conditions in which the raw chemicals are turned into end product.

With this information, the computer does the rest.

• Science News Letter, 79:158 March 11, 1961

# Drug Useless to Aged

► PROCAINE, or H3, the "rejuvenating" drug used by Prof. Anna Aslan at the C. I. Parhon Institute of Geriatrics, Bucharest, Romania, has been put into a preparation called Geriopil by a German drug company.

The drug also contains a variety of vitamins and vitamin derivatives, but tests showed that Geriopil failed to improve the mental deterioration of six elderly women.

Injections of sterile water were given to six of 12 senile patients at the same time the other six were given 12 injections of Geriopil during one month. The test administrator did not know which group was being treated. However, the water did more good than the drug. The injections were given intramuscularly.

Dr. M. D. Cashman, assistant psychiatrist, T. G. G. Lawes, clinical psychologist, Lancaster Moor Hospital, Lancaster, England, who report their study in the British Medical Journal, Feb 25, 1961, said the results of the test "cast very grave

## MEDICINE

## Radiation Surgery Tried

► HOPE FOR preventing cancer regrowth after surgery is seen in the use of a new radiation technique.

It will take a year or two to determine accurately what the effect of the treatment will be, but Dr. William H. Sweet, neurosurgeon at Massachusetts General Hospital, Boston, believes the technique will prove more effective than previous treatments of this type.

The new technique consists of opening the skull surgically to expose cancerous tissue to radiation touched off by a beam of neutrons emitted in the process of atomic fission in the reactor. The method was developed at the Massachusetts Institute of Technology and the hospital.

Eight patients with malignant brain tumors have been treated by neutron therapy at the M.I.T. nuclear reactor.

Several years ago Dr. Sweet and his collaborators conceived this type of therapy and administered treatments at the Brookhaven National Laboratory reactor, but the treatment could only be given from the side. This prevents opening the skull and necessitates the use of a stronger neutron flow.

The M.I.T. therapy room lies directly beneath the reactor, which permits a vertical neutron beam to be directed into the top of the patient's skull.

Treatment is based on the fact that certain boron compounds concentrate within cancer cells in the brain after being injected into the blood stream. The normal brain tissues form a barricade against the boron and, when neutrons emitted by the reactor are directed into the tissue area in which the boron is concentrated, they cause the boron atoms to give off alpha particles that have energy of 2.4 million electron volts.

doubts upon the claims made for the preparation."

Four out of the six patients who received Geriopil deteriorated, while five out of six untreated patients improved.

Only one of seven memory tests showed improvement among the treated patients. This exception was memory for design. In one other test, for memory of personal and current information, treated patients tied with the untreated.

In the remaining five, the investigators said, the untreated patients showed more favorable response. These five tests included orientation, mental control, logical memory for stories, digit span and associate learning.

The Bender gestalt test of figure-drawing, in which the patients were required to copy a few apparently simple geometric figures with no time limit, showed no evidence in favor of Geriopil.

The scientists said that although the numbers tested were small, an "effect contrary to the claims made for Geriopil seemed to have occurred."

• Science News Letter, 79:159 March 11, 1961

Since the alpha particles travel only about four-millionths of an inch, their destructive power is limited almost exclusively to the cancerous tissue. Neighboring healthy brain tissue is relatively untouched.

• Science News Letter, 79:159 March 11, 1961

## Do You Know

United States motor vehicle travel in 1960 totaled 720 billion miles, 46% of which was on urban streets.

Passenger cars in the U.S. averaged 14.3 miles per gallon of gas in 1960, commercial vehicles 4.6 miles per gallon of fuel.

The tuatara, the only surviving member in the world of a very primitive group of reptiles, is found in New Zealand.

Accidents in the United States took nearly 1,000,000 lives and caused an economic loss of \$100 billion during the last 10 years.

Nearly nine percent of the new cases of tuberculosis in the U.S. are due to organisms resistant to one or more of the major drugs, the percentage of resistance being highest to streptomycin.

Ninety-three million persons under 60 years of age in the United States have received at least one shot of polio vaccine.

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• Science News Letter, 79:159 March 11, 1961

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# • New Ideas and Gadgets •

For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D.C., and ask for Gadget Bulletin 1082. To receive this Gadget Bulletin without special request each week, remit \$1.50 for one year's subscription.

• **PAPER BAG HOLDER** of steel with lacquered brass finish will hold up to 50 empty paper bags of assorted sizes. It has four hooks for hanging keys, pot-holders or other kitchen items. Easily attached to any wood surface, the 14½-inch high holder also has a tray for pencils or bottle opener.

• Science News Letter, 79:160 March 11, 1961

• **SELF-POWERED RADIO** for space-minded children needs no batteries or electricity. Made of plastic with nose cone tuner, the radio has a trouble-free diode rectifier and comes complete with a high fidelity crystal earphone and 36-inch aerial.

• Science News Letter, 79:160 March 11, 1961

• **PRINTMAKER** does not need a darkroom or laboratory to turn out a sharp, dry and permanently finished photo print in ten seconds. Using a special formula photo paper and premixed, ready-to-use chemicals, the cigar-box size unit permits both professional and amateur photographers to print pictures from finished negatives in either daylight or artificial room light.

• Science News Letter, 79:160 March 11, 1961

• **INFANT SAFETY GARMENT**, shown in the photograph, makes a seat for baby. It provides a new way to prop and feed baby whether on bed, sofa, chair, crib, high-chair, stroller or in auto. The garment



type infant seat avoids bunched up clothing and bedding under baby.

• Science News Letter, 79:160 March 11, 1961

• **NATIONAL PARK RELIEF MAP** of Craters of the Moon National Monument, scaled one inch to half a mile, brings out hills and valleys in striking fashion. Also available in contour edition, the map con-

tains interesting, non-technical information on the phenomena to be seen in the area.

• Science News Letter, 79:160 March 11, 1961

• **HANGING KITS** for home and workshop feature special clips to hold tools or equipment to a perforated board. Board and clips for the tool hanging kit and for a utility closet hanging kit are available in separate units.

• Science News Letter, 79:160 March 11, 1961

• **SHATTERPROOF PLASTIC WINDOW** with reinforced glazing permanently eliminates glass replacement in windows. The glazing can be cut to size and installed with regular tools. Treated to block out up to 94% of infrared rays, the glass fiber panes are available in crystal clear, crystal green and stay white.

• Science News Letter, 79:160 March 11, 1961

• **FRY PAN FOR FATLESS COOKING** is easy to clean and economical to use because its non-stick surface is coated with a special resin. The aluminum pan, ten inches in diameter, has a very slick finish to which virtually nothing sticks. Chops, pancakes, hamburgers can be browned easily and quickly without fat; and washing in warm, soapy water with a dish cloth leaves the pan clean.

• Science News Letter, 79:160 March 11, 1961



## Nature Ramblings



► THAT FLIES ARE at least pests in the temperate zones and disease carriers in the tropics is well known. But not everything about the fly is bad.

The ichneumon flies, for example, destroy pests such as caterpillars, spiders, grubs, beetles and some relatives of the housefly. This is accomplished when the ichneumon deposits its eggs, through a stinger-like apparatus called the ovipositor, on the larvae of the pest species. The eggs hatch and the ichneumon larvae live on and kill the host.

The fruit flies, particularly *Drosophila melanogaster*, that cluster around decaying bananas are the guinea pigs of the insect world. For years they have been favorites for genetic studies because they reproduce rapidly and are easy to work with. By comparison with the ugly black housefly, these small creatures are beauties, with red eyes and iridescent wings.

### In Defense of the Fly



When mutants appear, some with white eyes and dull warped wings, geneticists try to find out whether the how, where and when of the change can be applied to some abnormality in man.

Some very odd insects have appeared in these studies. One scientist has produced four-winged flies that cannot fly.

A million years ago, flies probably had four wings, but the back pair shriveled up into club-shaped flight stabilizers called halteres. Thus, today's mutant four-winged flies are atavists.

Even the housefly, which has managed to survive in spite of DDT, is not so dirty-footed as once believed. About 90% of the tens of millions of bacteria dwelling in the maggot are shed by the time the insect develops to the larval stage and forms its hard outer shell.

When the new fly emerges, it carries only about 1,000 bacteria, 500 on the surface and 500 inside the body.

For those who still believe flies are good for nothing but swatting targets, remember what the frog ate the next time frog legs appear on the menu. And for tropical fish, ground flies can be the tastiest of morsels.

—GLORIA BALL

• Science News Letter, 79:160 March 11, 1961

